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of the gasteropod and the tentacles the epipodia. He also claims that the post-anal papillæ are osphradial in nature and are therefore an additional evidence for metamerism in these forms, while on the other hand he fails to find any metamerism in the cœlom.

Besides dealing with Nautilus Willey presents numerous other facts in this number of his "Results" among them many details as to the anthropology of the regions visited, and notes on tunicata, Amphioxus and Enteropneusta. K.

BOTANY.

Recent Literature on Seedlings.— In *Torreya* (Vol. II, pp. 113–117, August, 1902) Lloyd discusses "Vivipary in Podocarpus." During the last winter a specimen of *Podocarpus makayi* bore an excellent crop of fruit which germinated almost without exception and on the parent plant. The hypocotyl, he finds, is, when developed, of that club shape characteristic of certain other viviparous plants, as the mangroves, and is rich in food material, especially starch, which seems to be derived not only from the endosperm, but from its own photosynthetic activity as well as may be inferred from its greater weight, green color, and the presence of stomata. In most cases the primary root does not develop, but its place is taken by one or usually two lateral roots formed near the end of the hypocotl. He calls attention to vivipary in *Melocanna bambusoides* and its possible existence in other grasses, in *Tillandsia albisiana* and in *Quercus fusiformis* as well as interesting similarities in other oaks, and concludes that vivipary is by no means the unusual condition it is supposed to be. F. W. Rane ("How to grow a Forest from Seed." *Bull. N. H. Ag. Exp. Sta.* 95, November, 1902), figures a few tree seedlings though the bulk of the paper is naturally of an economic nature. In *Proc. Cambridge Philosophical Soc.*, Vol. XI, pp. 445–457, Pl. 5, 1902, Gardiner and Hill consider the histology of the Endosperm during the germination of *Tamus communis* and *Galium Tricorne.* Chauveaud in *Bull. Mus. d Hist. Nat.*, 1902, No. 1, pp. 52–59, discusses the arrangement of the vascular system in the cotyledon of the onion, *Allium cepa.*

Cyril Crossland ("Note on the Dispersal of Mangrove Seedlings," *Ann. of Bot.*, Vol. XVII, pp. 267–270, fig. January, 1903) observed mangroves growing in large numbers in the crevices in the hard coral limestone surface near high water mark on the east coast of Zanzibar, but only occasionally found them growing in mud, where the well-known method of planting may be observed. He frequently found embryos planted in holes in the rock at a distance of a hundred yards, and in a few cases some miles from the nearest parent tree. He frequently found the embryos floating vertically in the sea with the leaf bud just projecting above the water and concludes that the embryo is planted in any softness or crevice of the bottom upon the falling of the tide. The observation adds a quite distinct method of distribution for this interesting plant.

A contribution of importance to our knowledge of seedlings is that of Willis in his paper on the "Morphology and Ecology of the Podostemaceæ."[1] In an earlier number of the same publication Mr. Willis treated the systematic relations of the forms found in India and Ceylon and in the present paper for which the other was preparatory he discusses the anatomy and ecology of the different forms and when material was available the developmental stages as well. The peculiar ecological conditions under which the members of the family are to be found are discussed, and in addition to the descriptions and figures of the young stages of several forms given in the systematically arranged portion of the paper some theoretical considerations are taken up in his quite extensive general discussion and summary.

The germination of the seed of *Peperomia* and *Heckeria* has been studied by Johnson (*Bot. Gaz.*, Vol. XXXIV, pp. 321–340, Pls. IX and X. 1902). He finds that the swelling of the embryo and endosperm bursts the seed coats and that the endosperm protrudes through the rent as a sack, which surrounds the small, undifferentiated embryo until cotylelons and root have been developed when the root breaks through the endosperm which still surrounds the tips of the cotyledons and remains imbedded in the seed till all the starch of the perisperm is absorbed. While only careful chemical work can yield a definite answer to the question the morphological features indicate that the aleurone containing endosperm of these forms serves not as a storage organ for food material, but as a digesting and absorbing apparatus for transferring the reserve starch of the perisperm to the embryo. He suggests that in several genera of Cannaceæ, Polygonaceæ, Phytolaccaoceæ, Caryophyllaceæ, and others, a thin layer of endosperm separating perisperm and embryo may serve the same function. J. A. HARRIS.

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[1] Willis, J. C. Studies in the Morphology and Ecology of the Podostemaceæ of Ceylon and India. *Ann. Roy. Bot. Gard. Peradeniya.* Vol. i, pp. 267–465, Pls. IV–XXXVII. 1902.

The Origin of Monocotyledons.— The importance of a study of the seedling stages of plants in classification is being much emphasized of late. In a recent number of this Journal, Professor Campbell (*Am. Nat.*, Vol. XXXVI, pp. 7–12, January, 1902) touches on this question. In a more recent number (*Am. Nat.*, Vol. XXXVI, pp. 981–982, December, 1902) was reviewed the preliminary paper of Miss Sargent in which she announced a theory of the origin of the Monocotyledons from a dicotyledonous type. In the following number of the *New Phytologist*, (Vol. I, pp. 131–133, June, 1902) Tansley commends very highly in some ways the paper by Miss Sargent, but calls attention to the freedom with which the hypothesis of the derivation of a simple structure from a more complex one is nowadays used in morphological work, and to the danger of the too free use of this hypothesis in biological speculations, unless the special conditions determining the reduction are to be ascertained, since there seems to be no reason for believing that there is any general cause leading to reduction as compared with the primary tendency to increase in bulk and complexity of structure. He thinks that, while of the greatest interest in many ways, the generalized conclusions of Miss Sargent's paper should not be accepted without careful consideration.

In the current number of the *Annals of Botany*, Miss Sargent[1] presents in greater detail the theory recently announced, though she states that the evidence she has accumulated will not be published in detail until her monograph on the comparative anatomy of seedlings of the Liliaceae is completed. In the opening pages she discusses the nature of the evidence employed in formulating her theory, This is followed by observations on the anatomy of seedlings, occupying nearly sixty pages, and considering the tribes Scilleæ, Tulipeæ, Asphodeleæ. Allieæ, Dracæneæ, Asparageæ and Aloineæ of the Liliaceæ, to which her work has been principally confined, with fewer examples from the Amaryllidaceæ, Iridaceæ,

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[1] Sargent, E. A Theory of the Origin of the Monocotyledons, founded on the Structure of their Seedlings, *Ann. of Bot.*, Vol. xvii, pp. 1–92, Pl. I–VII, January, 1903.